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# Winter Oats for the *South*

Farmers' Bulletin No. 2037

U. S. DEPARTMENT OF AGRICULTURE

## RECOMMENDED VARIETIES OF DISEASE-RESISTANT AND HARDY OATS

### COMMON WINTER OATS—Disease-resistant, semi-winter-hardy

Arlington	Mustang
Atlantic	Stanton
DeSoto	Traveler
Letoria	

### COMMON WINTER OATS—Non-disease-resistant, winter-hardy

Lee  
Wintok

### RED OATS—Disease-resistant

#### *Semi-spring- to semi-winter-hardy*

Alber  
Camellia  
Southland

#### *Semi-winter-hardy*

Carolina Red	Ranger
Fulgrain	Rustler
Fultex	Victorgrain
Marett Winter Resistant	

### RED OATS—Non-disease-resistant

#### *Semi-winter-hardy Fulghum types*

Fulghum (original)  
Frazier  
Kanota

#### *Semi-winter-hardy Red Rustproof types*

Alabama Red Rustproof 43A	New Nortex
Appler	Nortex
Bancroft	Nortex 107
Delta Red 88	Terruf
Ferguson 922	Tifton 14
Hastings Hundred Bushel	

#### *Winter-hardy*

Forkedeer	Lemont
Fulwin	Tennex
LeConte	

## ADVANTAGES IN GROWING RECOMMENDED VARIETIES

Resistant to many races of crown rust and smut.  
Superior yielding power.  
High test weight.  
Early maturity.  
Lodging resistance.  
Greater winter hardiness.

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# WINTER OATS FOR THE SOUTH

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## MORE OATS NEEDED IN THE SOUTH

Growing populations and expanding industries in the South have created a need for increased production of oats and other feed grains. More feed is needed to support local livestock industries and thus insure satisfactory diets for those living in the area—diets that include ample meat, dairy, and poultry products. The high thiamine (vitamin B<sub>1</sub>) content of oats contributes materially to their value as food and feed. Furthermore, the increasing cost of feed grains transported from other sections must be met at least in part by greater local production. The development of improved cultural methods peculiar to the South and the availability of disease-resistant and heavier yielding new varieties now afford the South an opportunity to produce more home-grown feed and thus to become more self-sustaining than it has been in the past.

Winter oats is one of the most satisfactory grain, hay, pasture, and winter cover crops for the South. Moreover, fall-sown oats greatly outyield spring-sown oats in most of the southern sections. The Arkansas Agricultural Experiment Station, at Fayetteville, for example, reported that the average yield of the five highest yielding fall-sown varieties, grown for 21 years, was 17 bushels an acre, or 42 percent higher than the five highest yielding spring-sown varieties.



## THE SOUTHERN WINTER OAT REGION

The southern winter oat region may be divided into three general areas: (1) The Gulf coast (lower South) area; (2) the southern winter red oat area, which coincides with the Cotton Belt; and (3) the common winter oat area immediately to the north.

### LIMITING FACTORS IN SOUTHERN WINTER OAT PRODUCTION

Disease and winterkilling have slowed the increase in production of fall-sown oats in the South. Throughout the Gulf coast area the chief limiting factor, up to a few years ago, was crown (leaf) rust, which occurs nearly every year. This disease frequently reduces the yield and quality of oats in the larger red oat area immediately to the north. The appearance of hitherto unknown strains, or races, of crown (leaf) rust, such as races 45 and 57, has checked the distribution of several improved varieties that are resistant to the old races of crown rust.

Stem rust also causes serious losses, especially in Louisiana and Texas. Following the distribution of varieties resistant to the more common strains (races) of crown rust, it was discovered that stem rust causes greater losses than had earlier been thought possible.

Since 1947, especially in the lower South (Gulf coast area), Victoria, or *helminthosporium*, blight<sup>1</sup> has seriously reduced the value of comparatively new varieties such as Fulgrain, Fultex, Victorgrain, Stanton, Quincy Red (Quincy 1), Quincy Gray (Quincy 2), Florilee, Ranger, and Rustler. In 1947 Victoria blight was so destructive in northern Florida and other sections of the Gulf coast as to render these new varieties of little value for that area.

Losses also have been caused by the oat smuts, although in many sections they have been kept under control by seed treatment. Heavy smut infection has occurred most frequently in sections where strains of the highly susceptible Fulghum-type oats have been grown. However, with the gradual replacement of Fulghum with smut-resistant varieties, oat smuts have become decidedly less prevalent and destructive.

In recent years, relatively new diseases such as mosaic<sup>2</sup> (a virus disease) and leaf spot or blotch<sup>3</sup> have appeared and have caused some damage to fall-sown oats. Mosaic has occurred mainly in North Carolina, South Carolina, Georgia, and Alabama on land usually continuously cropped to oats. However, mosaic also occurred on land at Experiment, Ga., that had been cropped to a 3-year rotation of oats, corn, and cotton. While this disease is a potential threat to fall-sown oats, it has not as yet reached epidemic proportions in commercial fields over wide areas. Leaf spot has appeared in epidemic proportions in northern Florida and other sections of the Gulf coast area.

Anthraco-nose<sup>4</sup> has caused some losses to oats in Arkansas and was reported in Kentucky in 1949. Fortunately, this disease can be controlled through the breeding and growing of resistant varieties.

<sup>1</sup> Caused by *Helminthosporium victoriae* Meehan & Murphy.

<sup>2</sup> Caused by *Marmor terrestre* McKinney.

<sup>3</sup> Caused by *Helminthosporium avenae* Eidam.

<sup>4</sup> Caused by *Colletotrichum graminicolum* (Ces.) G. W. Wils.

## IMPROVED VARIETIES STIMULATE OAT PRODUCTION IN THE SOUTH

The introduction of the Victoria and Bond varieties, which are resistant to many races (strains) of crown rust and to the oat smuts, contributed much to oat improvement in the United States. Numerous new disease-resistant and productive varieties of southern oats developed from crosses of these varieties have been distributed. Unfortunately, most of the Victoria-related varieties recently have become less desirable because of their susceptibility to the destructive Victoria blight. The susceptibility of the Bond-derived oats to new strains of crown rust, such as races 45 and 57, which first appeared in epidemic proportions in the lower South in 1947, has seriously retarded the further distribution of varieties such as Florida 167, Coker 45-67, and Delair.

This disease situation necessitates an adjustment of the farmer's choice of varieties, especially in the Gulf coast area. The reaction of specific varieties to different plant diseases and the value of the varieties recommended for the various areas of the southern winter oat region are discussed in this bulletin.

### COMMON WINTER OATS

#### Disease-Resistant Varieties

Common winter oats are grown mostly in the more northern parts of the winter oat belt. The varieties usually are poorly adapted and thus are not recommended for the lower South.

Several varieties of a more or less intermediate type between common and red oats, such as Stanton, DeSoto, and Florilee, offered some promise for the lower South until Victoria blight destroyed their usefulness there. Several of these varieties are still suitable for the more northern parts of the red oat area, where Victoria blight is less destructive.

In the northern common winter oat area, where winter hardiness is more important as a rule than disease resistance, Victoria-derived varieties such as Fulgrain, Victorgrain, Letoria, Stanton, DeSoto, and Traveler can still be grown successfully, provided they are sufficiently hardy. Consequently, they are recommended for parts of these areas where Victoria blight is not yet prevalent, especially when they are grown in a crop rotation and all of the seed is treated with New Improved Ceresan or Ceresan M.

Two new, early, rather tall varieties, Arlington and Atlantic, were developed from a (Lee-Victoria) × Fulwin cross made at Aberdeen, Idaho, in 1937. These new varieties are of much promise for the more northern parts of the winter oat belt. The original selections giving rise to these varieties were made at Arlington Experiment Farm, Rosslyn, Va., and Beltsville, Md. They are similar in their disease reactions to the Stanton and Letoria varieties, including susceptibility to Victoria blight. Fortunately, in the common winter oat area, they have been free from this disease and are superior in yield to Lee, Letoria, and Stanton. They also are nearly as hardy as Lee and are resistant to the mosaics of oats. Arlington and Atlantic were developed cooperatively by the United States Department

of Agriculture and the agricultural experiment stations of the Southern States (fig. 1).

DeSoto was developed from a cross between Lee and Victoria at the Rice Branch Experiment Station, Stuttgart, Ark., by the Arkansas Agricultural Experiment Station in cooperation with the United States Department of Agriculture. The cross was made at Arlington Experiment Farm, in 1931, and the final selection, later named DeSoto, was made at Stuttgart in 1937. DeSoto was first distributed to farmers about 1943. It has the shortest straw of the varieties derived from the Lee-Victoria crosses, is resistant to many races of crown rust and the oat smuts, and has been relatively free from Victoria blight in the area where grown.



FIGURE 1.—Field of Arlington winter oats on farm near Blacksburg, Va.

Letoria, a very vigorous oat, likewise was developed from the same Lee-Victoria crosses as DeSoto. The final selection was made in 1936 and subsequently was tested at stations in North Carolina by the North Carolina Agricultural Experiment Station in cooperation with the United States Department of Agriculture. Letoria was first distributed in that State in 1941. Of the varieties originating from Lee-Victoria crosses, Letoria has been the hardiest as well as the most resistant to crown rust. It is resistant to many races of the oat smuts. It is, however, susceptible to Victoria blight, although usually it is free from the disease in the area where grown.

Mustang, a new winter oat variety of promise for northern Texas and southern Oklahoma, originated from a cross between Fulwin and a selection from a Lee-Victoria cross. The cross was made at Aberdeen, Idaho, and the original selection was made at Arlington, Va.

Mustang was reselected from the original selection and tested co-operatively by the Texas Agricultural Experiment Station and the United States Department of Agriculture at Texas Substation No. 6, Denton, Tex. Mustang is nearly as hardy as Fulwin and is resistant to most races of crown rust. It is somewhat prostrate in early growth, rather early maturing, and has a shorter straw than the Fulwin parent. Mustang also has been more productive than Fulwin, especially in years of heavy crown rust infection in the area of its adaptation.

Stanton was selected from a cross between Lee and Victoria by a commercial seed company, which first placed it on the market in 1941. It is thus closely related to DeSoto and Letoria and has the same disease reactions. Stanton differs mainly from Letoria in having decidedly fewer awns and more distinctly yellowish grains.

Traveler, likewise a relatively new variety, was developed primarily as a forage oat from a Victoria-Custis cross made by the Arkansas Agricultural Experiment Station. It was first distributed in Arkansas in 1944. Traveler is a midseason, vigorous, winter-hardy oat with resistance to crown rust and smut. It is susceptible to Victoria blight. It has been very productive of both grain and forage in northwestern Arkansas. However, its distribution has been retarded to some extent because its variability in grain and plant characters has interfered with the production of certified seed.

### Winter-Hardy Varieties

Lee, Pioneer, and Wintok are among the hardiest varieties of winter oats. Lee and Pioneer are somewhat less hardy than Wintok. These varieties lack disease resistance but rank high in vigor and yield.

Lee was first distributed widely under the name of Lee Coldproof by a commercial seed company in Virginia about 1925 and has been a leading variety in that State. It was selected from a cross between Winter Turf (Virginia Gray) and Aurora, the latter a stiff-strawed, high-quality yellow oat with little winter hardiness. The cross was made at Arlington, Va., in 1916, and the plant giving rise to Lee survived the extremely severe winter of 1917-18. Although resistant to Victoria blight, Lee is not resistant to the rusts and smuts. Nevertheless, it has been one of the most vigorous and productive varieties of common winter oats developed for the northern part of the winter oat belt.

Custis, a sister of Lee and similar to it, has been grown to a very limited extent in northwestern Arkansas. During the last few years, however, it is being replaced by the disease-resistant Traveler oat and is no longer recommended.

Pioneer is a tall, winter-hardy variety, similar to Winter Turf, that has been grown on a very limited acreage in New Jersey. Pioneer, however, is no longer recommended, owing to its late maturity, weak straw, and low disease resistance.

Wintok (fig. 2) is definitely the hardiest winter oat that has been distributed in the United States. In long-time tests it has proved to be about 15 percent harder than the old Winter Turf variety. Because of its greater winter hardiness, Wintok has made fall-sown oats a much more certain crop in Oklahoma. The acreage sown to Wintok



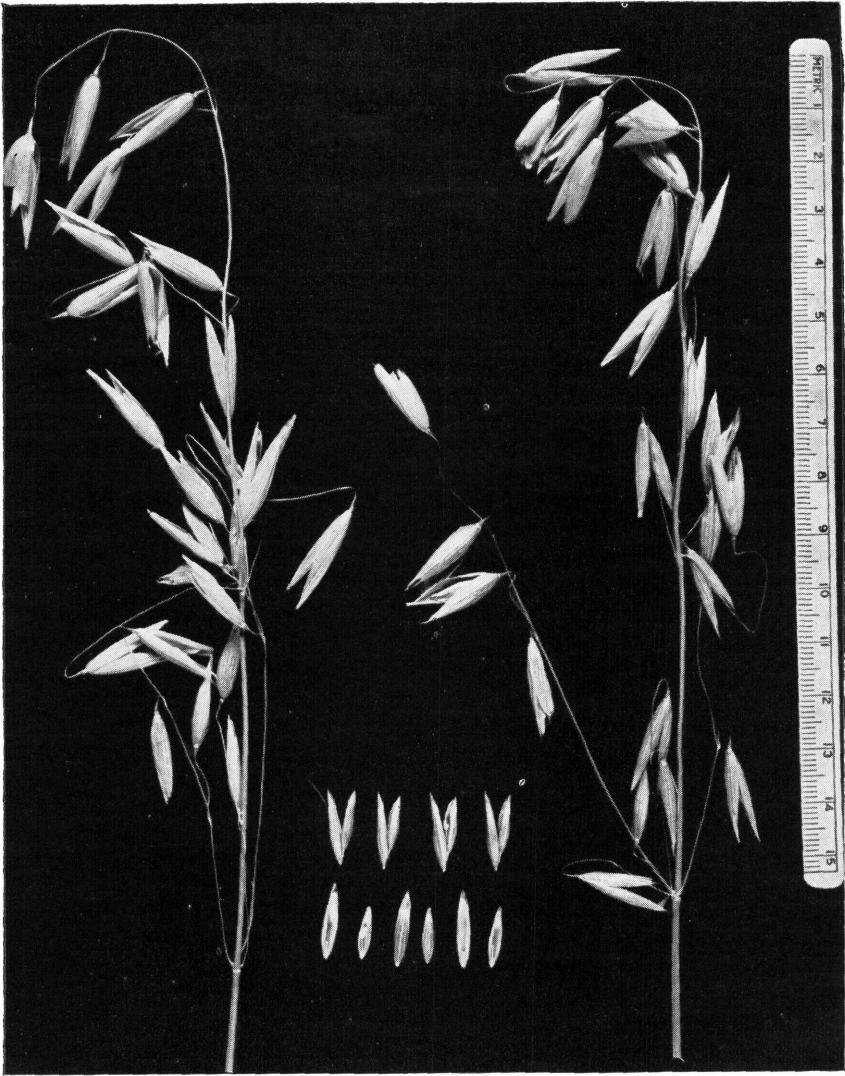


FIGURE 2.—Panicles, spikelets, and grains of Wintok, a winter-hardy common oat, grown mainly in Oklahoma and to some extent in northwestern Texas.

has been increasing in recent years, not only in Oklahoma but in the Rolling Plains area of northern Texas as well.

Wintok also has been very hardy in Kentucky and Virginia, but its weak straw has been an objection to the variety for this region. It is less productive than the hardy red oat varieties such as Forke-deer, Fulwin, and Tennex. Wintok originated from a cross between Winter Fulghum (C. I. 2499) (Pentagon) and the very hardy but rather low-yielding Hairy Culberson oat. The cross was made by the United States Department of Agriculture at Arlington Experiment Farm, Rosslyn, Va., in 1926, and unselected bulk seed in the fourth generation was sent to the Oklahoma Agricultural Experiment

Station, Stillwater, for testing and selection. The most outstanding selection from this cross of numerous tested selections was distributed under the name "Wintok."

## RED OATS

### Disease-Resistant Varieties

Many new varieties of disease-resistant red oats have been distributed in the South in recent years. Several of these varieties, however, are no longer recommended for certain sections where they now become damaged by Victoria blight. Among the current varieties of red oats that deserve mention are Alber, Camellia, Carolina Red, Fulgrain, Fultex, Ranger, Rustler, and Victorgrain.

Alber, a strain of the Red Algerian type of red oats with little winter hardiness that was introduced from South America in 1930, was formerly grown to some extent in the Gulf coast area. However, following the distribution of the then better adapted varieties, Quincy Red (Quincy 1), Quincy Gray (Quincy 2), Ranger, and Rustler, the later maturing Alber became of less importance. Following the occurrence of Victoria blight and the new strain (race) 45 of crown rust, Alber again has become of some economic importance. It has moderate resistance to race 45 and similar races.

Camellia (fig. 3) recently has become a more important variety in the Gulf coast area. It is more resistant to crown rust than Red Rustproof, Appler, or Nortex, and slightly more resistant than Alber. Camellia is the result of a cross between Bond and Alber and was first distributed from the Louisiana Agricultural Experiment Station

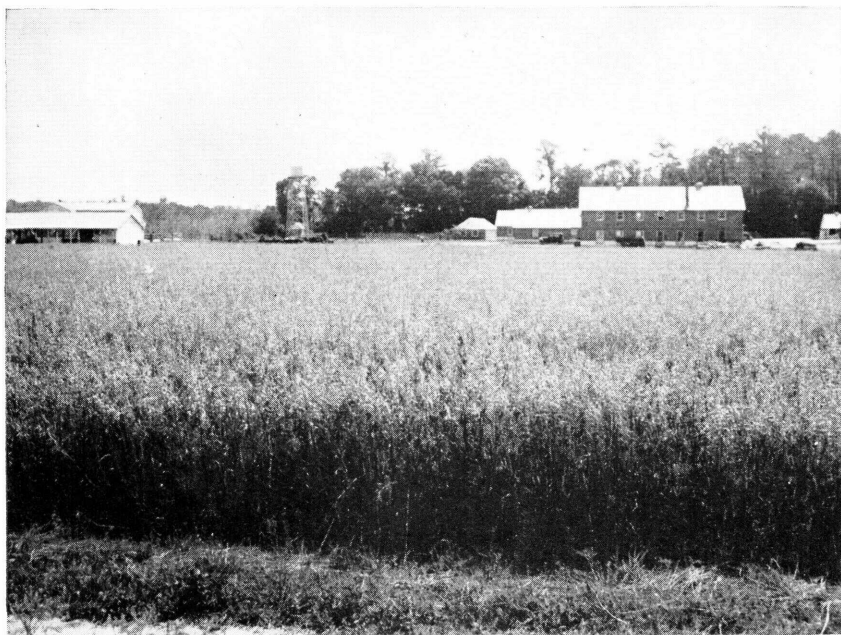


FIGURE 3.—Field of Camellia oats in north-central Florida in 1949.





FIGURE 4.—Combining field of Fulgrain oats grown for the production of certified seed in the Tidewater section of Virginia in 1949.

in 1941. The late maturity and slight variability of *Camellia* in certain grain characters have been somewhat unsatisfactory. Nevertheless, it has a stiffer straw and the kernels are shorter and plumper than those of the Red Rustproof strains. *Camellia* also is a better grazing oat in the lower South because of its vigorous and lush fall and winter growth, but is limited to the Gulf coast area because of its lack of winter hardiness.

Carolina Red is a Red Rustproof type oat with resistance to smut and to the older races of crown (leaf) rust but with only moderate resistance or tolerance to the newer races. It was first distributed to farmers about 1944 by a commercial seed company at Westminster, S. C. It originated from a Nortex-Victoria cross made by the United States Department of Agriculture at Arlington Experiment Farm, Rosslyn, Va., in 1930, from which many selections were made and tested at Arlington Farm and at Tifton, Ga. A reselection made at Tifton (T. 63) was tested at Experiment, Ga., and later at Westminster, S. C. It was named Carolina Red and differs from typical Red Rustproof oats primarily in having slightly more slender grains, greater winter hardiness, and a little more resistance to crown rust. Carolina Red is being grown to some extent in western South Carolina.

The Fulgrain (fig. 4) and Victorgrain strains still rank among the most important varieties of red oats in the South despite their susceptibility to Victoria blight. In the main red oat area, or Cotton Belt proper, these varieties have been grown most satisfactorily in crop rotations in which oats occur not oftener than every third or fourth year. Early maturity has been one of the most important factors contributing to their continued successful culture. Their resistance to crown rust race 45 and to most strains (races) of the oat smuts and their freedom from the numerous undesirable awns and basal hairs so common to Red Rustproof strains have added greatly to their popularity among southern farmers.

Fulgrain and Victorgrain are not recommended for the Gulf coast area and the southern edge of the main red oat area, because of their

susceptibility to Victoria blight. The distribution of these varieties in the South has been maintained during the past decade by commercial seed breeders at Hartsville, S. C. The various strains of Fulgrain and Victorgrain that are resistant to crown rust and smut all originated from a cross between the original Fulgrain variety and Victoria.

Fultex, a variety slightly hardier than Nortex and other Red Rust-proof strains, was selected from a Fulghum-Victoria cross at Substation No. 6, Denton, Tex. The cross was made at Arlington Experiment Farm, Rosslyn, Va., in 1930. Fultex is resistant to crown rust and to many races of smut, and it has a short, stiff straw that is very satisfactory for combining. Fultex's red to reddish-yellow grains and its susceptibility to Victoria blight have retarded its further distribution as a winter oat in central Texas. Where crop rotation is practiced, Fultex is satisfactory and is especially well suited for spring seeding because of its earlier maturity and crown (leaf) rust resistance. It is well adapted to the Rolling Plains area of northern Texas, where Victoria blight has not been a factor in yield, owing to limited precipitation and to low temperatures at seeding time.

Marett Winter Resistant, a Fulgrain-type oat, has been distributed by a commercial seed company at Westminster, S. C., since about 1938. Marett Winter Resistant, like Fulgrain Strain 3, from which it was selected, is resistant to certain races of the oat smuts. It also is slightly hardier than the crown-rust-resistant Fulgrain strains that resulted from crossing the original Fulgrain with Victoria. Marett Winter Resistant is grown to a limited extent, chiefly in the Piedmont and mountain sections of South Carolina (fig. 5).

Ranger and Rustler are satisfactory varieties of the Red Rustproof type for southern Texas when proper care is given to crop rotation and seed treatment. Because of susceptibility to Victoria blight, however, they probably are less popular than formerly. They are especially suitable for grazing. Ranger and Rustler should be sown mainly in the areas of limited rainfall in Texas around and west of



FIGURE 5.—Growing winter grains on terraced land in South Carolina. Increase field of Marett Winter Resistant oats in the foreground.



San Antonio. These varieties originated from a Nortex-Victoria cross made at Arlington Experiment Farm, Rosslyn, Va., in 1930. The final selections, giving rise to Ranger and Rustler, were made and tested by the Texas Agricultural Experiment Station, at College Station, Tex. They were first distributed in 1941.

One of the most recently developed disease-resistant varieties is Southland that originated from a cross between Iowa D69×Fultex. It is a semispring to semiwinter oat, resistant to crown rust. Southland is being distributed in northern Florida, where it appears to be especially well adapted. It is the product of cooperative oat breeding by the Florida, Iowa, and Idaho Agricultural Experiment Stations and the United States Department of Agriculture.

## **Old Standard Varieties**

### **Fulghum Types**

Fulghum oats are less important in the South than formerly, owing to their lack of winter hardiness, high susceptibility to the rusts and smuts, and variability in plant and grain characters. Their tendency to produce numerous offtypes, including false wild, or fatuoid, oats is well known. Throughout the South they have been largely replaced by hardier and, in most cases, improved disease-resistant varieties.

Named strains of Fulghum include Frazier and Kanota. One of the chief advantages of the Fulghum strains has been their early maturity. However, the distribution of Frazier in Texas, where it originated, has been discontinued, but it is still grown commercially to a limited extent. Frazier is inferior to New Nortex and Ferguson 922 for fall seeding in north-central Texas. Kanota, formerly grown extensively as a spring variety in the southwestern spring-sown red oat region, has been grown very little from fall seeding in the South, although it is equally as hardy as the original Fulghum.

### **Red Rustproof Types**

The growing of Red Rustproof varieties is now being resumed in many sections of the lower South. As previously stated, the destructive Victoria blight has damaged the Quincy Red, Quincy Gray, and Ranger varieties since 1947. Also, a new race of crown rust attacked Florida 167, Coker 45-67, and Delair, new varieties derived from Bond crosses, in 1948 and 1949.

Red Rustproof oats have been grown in the South for more than three-quarters of a century. Many strains of the variety have been selected and distributed through the years and have completely replaced the unselected Red Rustproof, or Red Texas, variety. Among those now grown to some extent are Alabama Red Rustproof 43A, Appller, Baneroft, Delta Red 88, Ferguson 922, Hastings Hundred Bushel, New Nortex, Nortex, Nortex 107, Terruf, and Tifton 14. All of these are similar, but they differ slightly in yield, plant height, and maturity. The grain of these strains is identical.

Alabama Red Rustproof 43A was selected and distributed from the Alabama Agricultural Experiment Station. This oat, however, has never gained wide acceptance with growers, and seed stocks are very limited.

Appller is a well-known strain, originating in Georgia many years ago on a farm of a Mr. Appller, for whom the oat was named. It has

been standard for decades, especially in the Southeastern States, but is now grown less than formerly.

Bancroft has been grown in Georgia and other Southeastern States for many years. It was selected and distributed by R. M. Turner, who lived near Royston, Ga. The strain has been kept reasonably pure and is still standard in east-central Georgia. Bancroft has been about equal to Appler in hardiness and productiveness, although it is not so widely accepted.

Delta Red 88 originated as a panicle selection from Ferguson 922 and was distributed around 1945 from the Delta Branch Station, Stoneville, Miss. Its culture has been limited mainly to that State. It has been a very productive strain and is uniform in plant and grain characters. Delta Red 88 has the stiffest straw of any of the Red Rustproof strains.

Ferguson 922, first distributed about 1926 by a commercial seed company, ranks among the important strains of Red Rustproof oats grown in Texas and other Southern States. This strain superseded Ferguson 71, which was first distributed by the same company many years previously. Both strains are pure-line selections from Texas Red Rustproof and have been very productive and uniform in plant and grain characters.

Hastings Hundred Bushel is a mass selection of Appler and was first distributed by a commercial seed company at Atlanta, Ga., about 1920. This oat has recently been reselected, and pure seed is now being distributed by the originating company.

Nortex and New Nortex are two of the hardiest and most widely grown improved strains of Red Rustproof oats. Nortex was selected from Texas Red Rustproof in 1914 at Substation No. 6, Denton, Tex., and was first distributed to farmers in 1926. New Nortex also originated at Substation No. 6, as a selection from the Appler. New Nortex has outyielded the older Nortex slightly in tests at Denton and other substations in Texas; hence, it was distributed in 1936 to farmers. Nortex is no longer distributed; in Texas it has been largely replaced by New Nortex. However, both Nortex and New Nortex are grown in Oklahoma, Arkansas, Louisiana, Mississippi, Alabama, Georgia, and Florida.

Nortex 107, distributed about 1947 by a commercial seed company located at Stoneville, Miss., is a reselection from Nortex. It has been similar to Nortex and New Nortex in yield in Mississippi and other Southern States. Nortex 107 is now grown mainly in the Delta section of Mississippi.

Terruf is a strain of Red Rustproof that originated as a pure-line selection from a mass lot of Red Rustproof oats made by the late R. P. Bledsoe, at the Georgia Agricultural Experiment Station, Experiment, Ga. It was first distributed about 15 years ago. Although a very uniform, hardy, high-yielding strain, Terruf has not attained much economic importance outside of Georgia.

Tifton 14 is a strain of Red Rustproof oats that was distributed from the Coastal Plain Experiment Station, Tifton, Ga., about 1947. It is uniform in plant and grain characters and has been especially promising for southern Georgia.

Other strains of Red Rustproof oats of only local importance include Baylis and Madison County Red.

## Winter-Hardy Varieties

Forkedeer, Fulwin, and Tennex, relatively new but not disease-resistant varieties of red oats, have become of considerable economic importance because of their winter hardiness and their adaptation to the more northern parts of the fall-sown oat region of the South. These varieties are reselections from Fulghum (winter-type selection

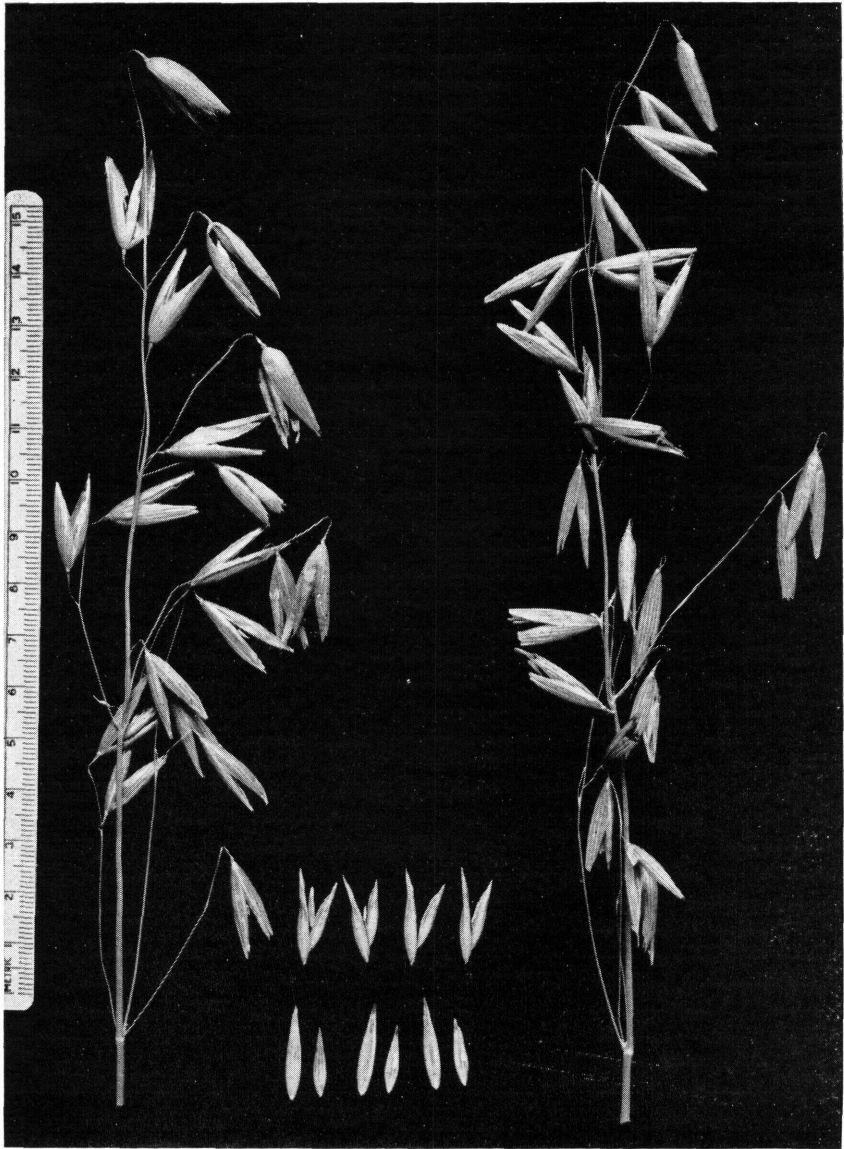


FIGURE 6.—Panicles, spikelets, and grains of Forkedeer, a winter-hardy red oat, grown mainly in the more northern and colder parts of the southern winter oat region.

C. I. 2499) made at the Tennessee Agricultural Experiment Station, Knoxville, Tenn., and are usually classified as red oats, although they are similar to common oats in certain grain characters. The original variable strain C. I. 2499, isolated at Arlington Experiment Farm, Rosslyn, Va., in 1920, was sent to the Tennessee station in the fall of 1929 for testing and further purification. Three of the more promising reselections were later named Fulwin, Tennex, and Forkedeer. C. I. 2499 was named Pentagon in 1951.

In tests at Knoxville and other locations in Tennessee, these three varieties yielded about 60 percent more than the old Winter Turf variety. Fulwin and Tennex were distributed about 1940. Forkedeer (fig. 6) was released a few years later, and in recent years has largely replaced Fulwin and Tennex in Tennessee, southwestern Virginia, and Kentucky because of higher yield and shorter, stiffer straw with better standing ability. Forkedeer also is grown to some extent in southern Indiana, where it apparently has been hardier and has shown better standing ability than either Fulwin or Tennex.

Some Tennex and Forkedeer oats are also grown in central Oklahoma, and Fulwin is grown to a limited extent in the Rolling Plains section of Texas.

LeConte is a new winter-hardy red oat, developed from a cross between Tennex and Bond, recently released by the Tennessee Agricultural Experiment Station. It has a stiffer straw and, hence, is better adapted for combine harvesting than Forkedeer on soils of high fertility.

Lemont originated as a selection from a Lee-Fulghum (winter-type) cross at the Piedmont Branch Station, Statesville, N. C. The cross was made at Arlington Experiment Farm, Rosslyn, Va., in 1926. It is similar to Fulwin, but not so winter-hardy. Lemont, like Fulwin and Forkedeer, is susceptible to the rusts and smuts, but has outyielded varieties such as Lee, Letoria, and Stanton in tests in the Piedmont section of North Carolina by nearly 10 bushels to the acre. It is a vigorous oat but has a weak straw. Lemont was first distributed about 1945 for growing in the Piedmont section of North Carolina. It was developed cooperatively by the North Carolina Agricultural Experiment Station and the United States Department of Agriculture.

## VARIETIES RECOMMENDED FOR DIFFERENT STATES AND SECTIONS

**Southern New Jersey, Delaware, southern Maryland, and the Eastern Shore of Maryland**

Forkedeer, Fulwin, Arlington, Letoria, and Lee.

**Virginia**

*Tidewater region.*—Letoria, Lee, Arlington, and Stanton. *Piedmont.*—Lee, Letoria, Arlington, Atlantic, and Forkedeer. *West of Blue Ridge Mountains.*—Lee, Forkedeer, and Wintok, the latter only for elevations above 2,000 feet.

## North Carolina

*Coastal Plain*.—Arlington, Fulgrain, Victorgrain, and Stanton. *Piedmont*.—Arlington, Stanton, Atlantic, Lee, Lemont, Fulgrain, and Victorgrain. *Western foothills*.—Atlantic, Forkedeer, and Lee.

## South Carolina

*Coastal Plain*.—Fulgrain, Victorgrain, and Stanton. *Piedmont and western South Carolina*.—Marett Winter Resistant, Lee, Fulgrain, Arlington, and Carolina Red.

## Georgia

*Coastal Plain and southern Georgia*.—Appler, Bancroft, Tifton 14, Camellia, and Alber; also Arlington, Stanton, and Victorgrain when grown in suitable rotation. *Central Georgia*.—Appler, Bancroft, Terruf, and Tifton 14; also Arlington, Stanton, Fulgrain, and Victorgrain when grown in suitable rotation. *Northern Georgia*.—Arlington, Atlantic, Forkedeer, Letoria, Stanton, Fulgrain, Victorgrain, and Appler.

## North and Northwestern Florida

Southland, Camellia, Tifton 14, and Alber.

## Kentucky

Forkedeer, Fulwin, and Tennex.

## Southern Indiana

Forkedeer.

## Tennessee

Forkedeer, Fulwin, Tennex, Stanton, and LeConte.

## Alabama

*Southern*.—Tifton 14 (Red Rustproof 14), Alber, Appler, Delta Red 88, Nortex, Nortex 107, and Camellia. *Central*.—Tifton 14, Alber, Appler, Delta Red 88, Nortex, and Nortex 107; also Victorgrain and DeSoto when grown in a suitable rotation or sown relatively late. *Northern*.—Tifton 14, Alber, Appler, Delta Red 88, Nortex, and Nortex 107; also Victorgrain, DeSoto, and Stanton when grown in a suitable rotation or sown relatively late.

## Mississippi

*Southern*.—Camellia, Alber, Baylis, Delta Red 88, Madison County Red, Nortex 107, and New Nortex. *Central and Delta section*.—Delta Red 88, Nortex 107, New Nortex, Baylis, Madison County Red; also Fulgrain and Victorgrain when grown in a suitable rotation. *Northern*.—Forkedeer, Arlington, Traveler, Ferguson 922, and New Nortex; also Victorgrain, Fulgrain, and Stanton when grown in a suitable rotation.

## Arkansas

*Northern*.—Traveler, Stanton, and Letoria. *Southern*.—Ferguson 922, Nortex, New Nortex, Nortex 107, and Appler. *Central and the Delta section*.—Ferguson 922, Traveler, and DeSoto. Since it is known that Victoria blight is less destructive when the temperature is below 70° F., the Arkansas Agricultural Experiment Station recom-



mends that varieties such as DeSoto, Letoria, and Stanton should be sown rather late, that they be used in a 2-year rotation or longer, and that the seed be treated with New Improved Ceresan or Ceresan M.

### Louisiana

*Southern.*—Camellia and Alber. *Northern.*—New Nortex, Nortex, Nortex 107, and Ferguson 922.

### Oklahoma

*Northwestern.*—Wintok. *Southwestern, central, and northeastern* (the area about 100 miles wide running diagonally from southwest to northeast across the State).—Wintok, Tennex, and Forkeddeer. *South-eastern.*—Traveler and Stanton. DeSoto is recommended for both grain and pasture in an area south and east of Garvin County by the Oklahoma Agricultural Experiment Station.

### Texas

*South-central and southern Texas.*—Alber and Camellia for grain for high rainfall belt along the Gulf coast. Ranger, Rustler, Camellia, Alber, Fultex, and Mustang for pasture. *Rolling Plains of northern and west-central Texas.*—Mustang, Fultex, New Nortex, Ferguson 922, and Stanton. *High Plains.*—Wintok, Mustang, and Fulwin.

## WINTER OAT CULTURE

Fall-sown oats serve as a companion crop for new legume seedlings. Ordinarily, winter oats are grown most advantageously in rotation with other crops. Where possible, they should follow a row crop such as cotton, corn, or soybeans. The oats thus provide a winter cover.

### Preparation of Seedbed and Seeding

Oats respond well to good cultural methods. A moist, friable seedbed that is firm below and topped with 2 or 3 inches of mellow soil is favorable for prompt germination and rapid plant growth and root development. Where fall-sown oats follow a row crop, plowing may be dispensed with if a satisfactory seedbed can be prepared by disking and harrowing (fig. 7). Usually an excellent seedbed for

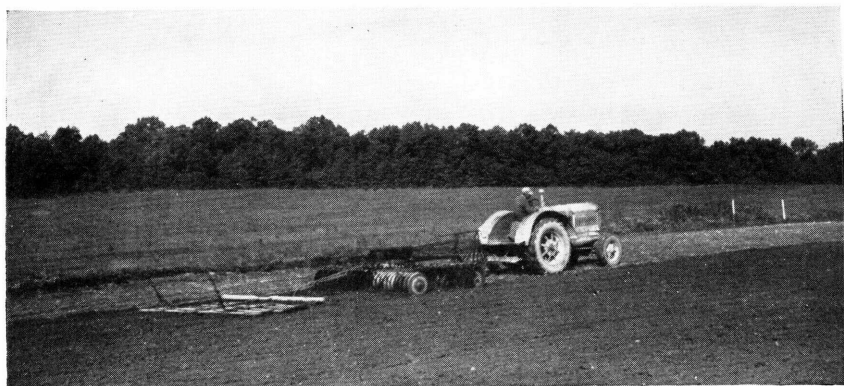


FIGURE 7.—Preparing land for winter oats on South Farm of the Plant Industry Station, Beltsville, Md.

winter oats is obtained by disking soybean stubble, especially when the crop has been cut for hay.

Winter oats should be sown with a grain drill to insure complete and uniform depth of covering of the seed. The small five-hoe or five-disk drill commonly used in the South is satisfactory for sowing winter oats between cotton rows.

### **Fertilizer Requirements**

Fall-sown oats respond well to liberal applications of commercial fertilizer. One of the best fertilizer treatments is 200 to 300 pounds of superphosphate applied at seeding time, followed by a top dressing in February or early March of 100 to 150 pounds of a chemical nitrogen fertilizer, such as nitrate of soda or ammonium sulfate. Ammonium nitrate, which ordinarily contains twice as much nitrogen as nitrate of soda, should be applied at a rate of 50 to 75 pounds to the acre. Oats usually cannot be grown successfully in many sections of the South without a nitrogen top dressing. Each 12 pounds of nitrogen (obtained from 80 pounds of nitrate of soda or 40 pounds of ammonium nitrate) added to the soil increases the oat yield about 10 bushels an acre.

As a rule it is not advisable to apply more than 30 pounds of nitrogen to the acre for oats, owing to the danger of excessive straw growth and consequent lodging. Under some conditions, however, as much as 48 pounds of nitrogen, or 300 pounds per acre of nitrate of soda, may be applied. Where available, legume residues or a light top dressing of well-rotted stable manure may replace commercial nitrogen fertilizers.

A 6-12-6 or a 7-14-7 complete fertilizer is preferable to superphosphate alone in sections where additional potash is necessary, especially on the more sandy soils.

In the Georgia Coastal Plain oats respond to potash more than to phosphate, and as much as 48 pounds of nitrogen per acre on poor land and 32 pounds of nitrogen on good land may be applied without causing lodging. About 400 pounds of a complete fertilizer, such as 4-8-6 or 4-8-8 may be applied at seeding time, followed by a top dressing of 16 to 32 pounds of nitrogen in the spring; or 150 pounds of 20 percent superphosphate and 50 pounds of potash may be applied at seeding time, followed by a top dressing of 32 pounds of nitrogen about February 15 to March 1.

### **Rate of Seeding**

Rather heavy rates of seeding for winter oats usually are necessary to insure a satisfactory spring stand, especially in areas where winter-killing is likely to occur. As a rule, it pays to sow 8 to 10 pecks an acre, although in the milder parts of the South a 6-peck rate frequently is ample, especially when the oats are sown at the best time in a fertile, well-prepared soil. Where oats are to be used for fall and winter pasture, the rate of seeding should not be less than 3 bushels and preferably 4 bushels of large-seeded varieties such as Letoria, Traveler, New Nortex, and Stanton.

### **Date of Seeding**

One of the essentials for producing satisfactory crops of winter oats is timely seeding. Late seeding has been one of the most frequent

causes of failure and of consequent discouragement with the crop. Winter oats should be sown early enough to give the young plants time to become well established before the occurrence of severe freezing weather. A good rule in the northern half of the winter oat belt is to sow 3 to 4 weeks before the average date of the first killing frost for the section. This is 3 to 4 weeks earlier than the best date for seeding wheat. For much of the Cotton Belt, best results usually are obtained by sowing not later than the last week of October, although in mild winters November seeding is about equally satisfactory. In the Gulf coast region, seeding may be delayed until November without too much risk.

### Seed Treatment Essential

All winter oat seed should be cleaned and treated with New Improved Ceresan, Ceresan M, or some other standard fungicide for the control of the smuts, root rots, and seedling blights, regardless of whether or not the new varieties are resistant to smut.

**All these chemicals are more or less poisonous. Care should be taken to avoid inhaling the dusts, to wash the used utensils, and to dispose of surplus treated seeds and chemicals so that they will not be eaten by livestock or poultry.**

Seed treatment is almost imperative for satisfactory yields of oats in the warm climate of the South, where parasitic organisms are abundant and very active in the soils. Even partial control of root rots and seedling blights will improve the vigor and yield of the crop.

### Certified Seed

Certified seed should be sown when new disease-resistant or hardy varieties are being grown for the first time in a locality. This will assure an adequate pure-seed supply of a desired variety for the neighborhood in future years.

For sources of seed of the varieties recommended, the farmer should consult his local county agricultural agent or write to his State extension service or State agricultural experiment station. Seed of the recommended disease-resistant and standard varieties should be available in sufficient quantities in most sections of the South.

## HARVESTING WINTER OATS

Oats are harvested with a binder, combine, or cradle. The combine has increased in use rapidly in recent years and has largely replaced the binder for harvesting fall-sown oats. The cradle is used occasionally in small fields on rough land. Some oats also are mowed.

Oats to be cut with the binder should be allowed to stand until most of the kernels are past the hard-dough stage, that is, until nearly all traces of green have disappeared from the grain and straw. They are then dry enough for the bundles to be shocked immediately. The shocks preferably should be capped to protect the oats as much as possible from weathering while curing in the shock. Bundle oats stored in the barn for feeding without threshing should be thoroughly dry when placed in storage.

Oats are combined directly or are threshed from the windrow by the use of a special "pick up" attachment on the combine. Direct combin-



ing is more popular and more economical than other methods, but windrowing is advantageous in weedy or uneven ripening fields, during wet periods, and where the stalks are likely to break over after ripening (fig. 8). In the South direct combining ordinarily must be delayed for 2 weeks or more after the oats are "binder ripe."

Oats windrowed at the "binder-ripe" stage or later usually are dry enough to be picked up and threshed after 3 or 4 days, if clear, dry weather has prevailed.

Threshed damp oats containing more than 13-percent moisture should be dried artificially or else spread on a barn floor or tarpaulin and turned occasionally to hasten drying. Oat straw is a valuable roughage for livestock.



FIGURE 8.—Combining Victorgrain oats with a self-propelled combine in South Carolina.

## FALL-SOWN OATS FOR FORAGE

Fall-sown oats furnish excellent hay and winter grazing for nearly all classes of farm animals. Winter oats cut for hay in the soft-dough stage and properly cured surpass other small-grain hays in quality and palatability. The yield and feeding value may be increased by growing the oats in mixture with a winter legume, such as vetch or clover (red or crimson). Oats and vetch make a very popular hay mixture in many sections of the South and in the Pacific Northwest. Fall-sown oats may supply considerable grazing during the late fall and winter and then later be harvested for hay or grain.

Grazing is likely to reduce the yield of grain, although with judicious pasturing the grain yield may sometimes be increased. Much lodging with consequent loss of grain may occur when the crop is sown on fertile soils and not pastured. Under such conditions grazing is both beneficial and profitable. The winter pastures supplied by winter oats sown primarily for grain in some sections of the South,

particularly in Texas and Oklahoma, is of considerable importance to the livestock industry. Oats should be pastured closely only on land that is to be plowed and planted to some other crop in the spring.

In the central part, as well as in some areas in the southern part of the fall-sown-oat region, lespedeza, a warm-weather legume, may be sown broadcast in the oats in February without covering the seed. This provides excellent summer grazing with little additional cost. It also is valuable for soil conservation and for hay and seed production.

The value of winter oats for forage in the South is enhanced by the growing of varieties resistant to crown rust and blight. Camellia is an excellent variety for pasture in southern Louisiana and other Gulf coast sections. Its broad leaves, heavy-tillering capacity, and vigorous early growth make it superior to Red Rustproof for pasture.

Fulgrain, Victorgrain, Letoria, DeSoto, and Stanton are suitable for pasture where Victoria blight has not been troublesome. Traveler was developed and distributed primarily for grazing in northwestern Arkansas.

The winter-hardy red oat varieties Forkeddeer, Fulwin, and Tennex have been rated very satisfactory for forage within their range of adaptation. Lee, Arlington, and Atlantic supply good forage in the more northern fall-sown-oat sections. Arlington and Atlantic also should prove to be high producers of hay because of their tall straw.

Since the development of all-year grazing systems in the South, efforts have been made to breed superior grazing varieties of oats for fall, winter, and spring pasture.

Oat pasture yields sometimes are doubled or trebled by a heavy top dressing with nitrogenous fertilizers.

